

Scientific Inquiry

5-1 The student will demonstrate an understanding of scientific inquiry, including the foundations of technological design and the processes, skills, and mathematical thinking necessary to conduct a controlled scientific investigation.

5-1.4 Use appropriate tools and instruments (including a timing device and a 10x magnifier) safely and accurately when conducting a controlled scientific investigation.

Taxonomy Level: 3.2-C Apply Procedural Knowledge

Previous/future knowledge: In previous grades, students used magnifiers and eyedroppers (K-1.2), rulers (1-1.2), thermometers, rain gauges, balances, and measuring cups (2-1.2), beakers, meter tapes and sticks, forceps/tweezers, tuning forks, graduated cylinders, and graduated syringes (3-1.5), and a compass, an anemometer, mirrors, and a prism (4-1.2) safely, accurately, and appropriately. In future grades, students will continue to use these tools, when appropriate, as well as use new tools when collecting scientific data. A complete list of tools can be found in Appendix A of the Academic Standards.

It is essential for students to know that different instruments or tools are needed to collect different kinds of data.

- A *timing device* is an instrument used to measure time.
 - An example of a timing device is a stop watch or clock with a second hand.
 - Time is measured in seconds (s), minutes (min), hours (hr), and days.
- A *10x magnifier* is a tool that is used to enlarge objects or see details.
 - Objects seen through a 10x magnifier look ten times larger than they do with the unaided eye.

It is essential for students to use care when handling these tools when gathering data.

- Care should be taken not to break or drop the timing device or magnifier.

It is also essential for students to use tools from previous grade levels that are appropriate to the content of this grade level such as eyedroppers, magnifiers, rulers (measuring to centimeters or millimeters), pan balances (measuring in grams), thermometers (measuring in °F and °C), beakers (measuring liters or milliliters), forceps/tweezers, graduated cylinders (measuring in milliliters), graduated syringes (measuring in milliliters), meter sticks and meter tapes (measuring in meters, centimeters, or millimeters), or compasses to gather data. Other units of measurement that students should be familiar with are kilograms (mass) or kilometers (distance).

NOTE TO TEACHER: See information in previous grades regarding how to use each tool.

All temperature readings during investigations will be taken using the Celsius scale unless the data refers to weather when the Fahrenheit scale is used.

It is not essential for students to know how to use spring scales or a more complex magnifier such as a microscope. Tools from previous grades that are not appropriate to the content of this grade level are not essential; however, these terms may be used as distracters (incorrect answer options) for assessment, for example measuring cups, rain gauges, tuning forks, anemometers, mirrors (plane/flat), or prisms. Students do not need to convert measurements from English to metric or metric to English.

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Assessment Guidelines:

The objective of this indicator is to *use* tools safely, accurately, and appropriately when gathering data; therefore, the primary focus of assessment should be to apply correct procedures to the use of a timing device, a 10x magnifier, and other tools essential to the grade level that would be needed to conduct a science investigation. However, appropriate assessments should also require students to *identify* appropriate uses for a timing device, or a 10x magnifier; *illustrate* the appropriate tool for an investigation using pictures, diagrams, or words; *recall* how to accurately determine the measurement from the tool; or *recognize* ways to use science tools safely, accurately, and appropriately.